Pacific Institute
for Climate Solutions
Knowledge. Insight. Action.

Climate Insights 101 discussion points: bite size

Available on YouTube at http://www.youtube.com/PICSClimateInsights

1. CO_2 and the Greenhouse Effect

Why does carbon dioxide (CO_2) have such a critical influence on the Earth's climate?

What are the main sources of carbon dioxide in the atmosphere?

How are greenhouse gases driving global warming?

How many years of collected data are necessary for scientists to affirm a climate trend?

Which has been the warmest decade so far in recorded human history?

What is the process or "chain" that has kept the Earth warm?

Why was it necessary to find a high altitude site for Dr. Keeling to measure CO_2 concentrations in the atmosphere accurately? If the site were at sea level, what might skew the findings?

What is a chemical fingerprint?

What are the four primary sources of human activities that add significant amounts of CO_2 to the atmosphere?

For Discussion:

What are some of the ways we could change the way we live and work to help decrease the amount of CO_2 we put into the atmosphere? What would we be willing to give up – as individuals and as industries? Making changes usually means someone pays, in some way. Make a grid of costs incurred and by whom if a) if no change occurs or b) if industry and/or individuals start making serious changes in the way we work and live.

2. More than just CO_2

Name the other greenhouse gases. Why is water vapour so important and why is it known as an “amplifier”?

What is the connection between global warming and increased levels of water vapour?

Increased methane in the atmosphere has resulted in part from more livestock being raised for meat and more rice paddies being cultivated. Which parts of the world have changed the most in terms of conversion of land use – to raising either cattle or rice?

Why has the demand for beef increased worldwide? As more people become better off and enter the middle class, their diets often change. Why do you think this is and where in the world has this change been noticed?

Beef and other meats have long been a part of many Canadian diets. Is it justified for us to tell other cultures not to eat beef?

What might be one solution to the problem of increased methane? Could the methane be trapped and used in other ways? Discuss how methane gas is used already in parts of the world.

We have also used nitrogen fertilizer for a long time for growing crops. What substitutes for this fertilizer are there and how could alternatives be encouraged?

We have known about the harm done by aerosol cans for decades now and generally people have responded to using alternative products. Name some products that still use chlorofluorocarbons.

We’ve all appreciated air-conditioned buildings on hot summer days, and especially while traveling. What are some other ways to air condition buildings, especially in large hotels and office towers? Would we be prepared to give up air-conditioned hotels while visiting tropical places?

3. Human Influence

It is difficult to imagine amounts like 33 and 800 billion tons – especially with something invisible, like CO_2, a gas. How does the example of the bath and tap water left running illustrate Mother Nature’s balance? Which “taps” have we opened up since the industrial revolution?

For Discussion:

Discuss how population growth, especially as it is increasingly concentrated in cities, affects the output of CO_2 into the atmosphere? Which of the world's cities have grown substantially in the last 30 years and which ones are also centres of industry?

Which is more of a problem for global warming – population growth or industrial growth? Or is it a matter of how industry operates and grows?

What about over-consumption and consumerism by wealthy countries and the attendant buildup of garbage? What part does that play – or does it – in global warming?

4. Mother Nature's History Book

Why is glacial ice a perfect substance for climatologists to study in order to illuminate climate's past?

Which two countries initially cooperated in the Antarctic ice cap?

What are the two key properties that can be measured in the ice and what does the past tell us about the present?

How have scientists been able to deduce that for a long time climate was relatively stable?

What have the compositional changes in tiny marine fossils told scientists?

If Mother Nature has caused dramatic and cyclical changes in Earth's climate for hundreds of thousands of years, why can't we say she is solely responsible for the changes in climate scientists have recorded in the past 30 years?

What was the book, and when was it written, that tried to explain why there had been multiple ice ages?

What is the correlation between temperature changes through time at Vostok and variations in sunlight received by the northern hemisphere?

What is the other important information that glacial ice yields?

Scientists estimate that human activities are now adding CO_2 to the atmosphere at a rate that is how much faster than ever before? How much faster?

For Discussion:

Find out more about what motivated the Russians and the French to begin conducting research in the Antarctic. Find out what Canada's scientists are doing there now.

If this kind of cross-cultural scientific collaboration is possible, what prevents countries from signing on to climate treaties and accords such as Kyoto?

5. The Influence of Natural Events

What are aerosols as they apply to volcanoes and how do they affect global warming?

El Niño and La Niña are natural occurrences that do affect the world's climate – but the extent of their impact varies. What determines how much these weather phenomena will affect the climate in any given year?

When did we first learn about the "sunspot cycle"? And what have we learned about them over the last 30 years as the Earth has warmed?

For Discussion:

Identify three volcanic eruptions within the last decade and discuss how each did or did not affect the climate – and why.

6. Is the Earth Cooling?

We've previously discussed the difference between 'weather' and 'climate'. How do some media reports still confuse the two when trying to make the case that global warming isn't occurring citing, for example, a particularly cool summer month?

What does the term "cherry-picking" mean and how is it used by the media to make a point about climate change?

For Discussion:

Find a couple of articles from the past which try to prove that climate change isn't occurring and analyze them to see how they are using selected bits of data – cherry-picking – to make their point. How can you disprove the points the articles are trying to make?

How can we learn to read media reports about climate change with a critical and informed eye?

7. Examples of Global Warming

Four examples are given in this 'bite' to show that global warming is a reality. What do each of the following tell us:

- Alpine glaciers – what is happening to them and why?
- Sea ice – what has happened to the Northwest Passage in the last three years? How has this helped researchers studying the Franklin expedition?
- Ocean temperature – what do the ARGO floats tell us?
- Sea level rise – what has caused this rise?

For Discussion:

Coastal cities, large and small, are under threat from sea level rise. Choose three cities or towns in BC that are right on the coast and consider how life could change for each with increasing sea level rise. Discuss what kinds of planning and preparatory issues need to be considered for these places, their businesses and residents.

8. The Threat posed by Acidification

What is calcium carbonate and why is it so vital to many sea organisms like clams and oysters?

What is happening as more human-induced carbon dioxide penetrates the sea and why is this important?

What is the worst-case scenario for organisms like coral that need carbonate to build their shells?

Name three of the world's most famous coral reefs and discuss how the countries to which they are attached depend on them for their tourist industry.

Discuss how our future food supply could be affected if clams, oysters, mussels, etc. could not thrive and reproduce.

It is often been said that if you change one aspect of Nature, you begin to change everything. Discuss how this applies to acidification and the ocean's food chain.

9. What is a Climate Model?

Which mathematical laws and what kind of instruments are used in climate modeling?

How is climate modeling different from weather forecasting?

Experts in climate modeling are careful to say they are “projecting” future climate, not “predicting”. How would you articulate the difference between the two words?

What is “attribution” and how is it used in climate modeling work?

What are “fingerprints”?

What are some examples of outside influences in climate modeling work?

What are “forcing agents”?

What can climate models tell us about our climate on both a continental and regional level?

For Discussion:

There are less than a dozen climate modeling centres in the world. Identify where each is located and discuss why each is located in those particular parts of the world? For example, how many are located in university towns? Is this a coincidence – or not?

10. Projecting Future Climate

When scientists use the term “scenario” in climate change work, what do they mean?

What is the SRES report and why was it so useful to climatologists?

What were climatologists able to project about future climate based on the information in the SRES report?

Why are projections of precipitation changes so important in BC?

Discuss what you know and what you might find out about storm water management in your city, town, or region. Has there ever been serious flooding where you live due to flash floods or exceptionally wet periods?

What are “growing degree days” and why are they so important to the people who produce the food we eat?

For Discussion:

Canola, grown in the Peace River region of BC needs about 1000 growing degree-days to mature. Find out about some other crops grown in BC that you eat and how many growing days each of them needs.

The three scenarios described in this ‘bite’ gives us important information when considering how our society – which is you and me – will develop. Do you now have a better idea of how important informed decisions are when making choices about planning for future climate changes?